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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/742,295	12/22/2000	Michael Scalora	1659.0650001/MVM/AJF	8153

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[REDACTED] EXAMINER

LEE, JOHN D

[REDACTED] ART UNIT [REDACTED] PAPER NUMBER

2874

DATE MAILED: 04/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/742,295	SCALORA ET AL. 
	Examiner	Art Unit
	John D. Lee	2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) 1-6,8-10,12,13,15,23-25 and 27 is/are allowed.
- 6) Claim(s) 7,11,14,16-22 and 26 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers *(Abstract)*

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 22 December 2000 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

#### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
  - a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

#### Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	6) <input type="checkbox"/> Other: _____

The ten (10) sheets of drawing filed on December 22, 2000, and the four (4) sheets of drawing filed on April 27, 2001 (total of fourteen (14) sheets), are acceptable.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The abstract of the disclosure is objected to because it is too long. The Rules of Practice currently limit the abstract to a maximum of 150 words, but the Examiner has counted 216 words in the abstract presently on file. Correction is required. See MPEP § 608.01(b).

Claim 23 is objected to because of the following minor informality: in line 8 of this claim, "a second photonic signals" should actually be "a second photonic signal". Appropriate correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7, 11, 14, 16-22, and 26 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 7 recites the terms "2 $\omega$ " and "3 $\omega$ ", but " $\omega$ " is undefined and the claim is, accordingly, indefinite. Also in claim 7, in the last line, there is no specific antecedent support for "the input photonic signal frequency". Does this refer to the *first* photonic signal frequency or the *third* photonic signal frequency? Claim 11 is indefinite because the recitations "a few hundred

nanometers" and "a few thousand microns" are non-specific and subject to a wide degree of interpretation. A more specifically defined range of values is required. In claim 14, line 1, there is no antecedent support for "the mixing step", thus rendering the claim indefinite. Perhaps this claim is intended to be dependent upon claim 13, wherein "the mixing step" is first defined. In claim 16, lines 9-10, there is no antecedent support for "the first and second frequencies". Notice that first and second frequencies are not defined until later in the claim. Claim 16 and all claims dependent thereon are therefore indefinite. In claim 26, line 1, there is no antecedent support for "the mixing step", thus rendering the claim indefinite. Perhaps this claim is intended to be dependent upon claim 25, wherein "the mixing step" is first defined.

Claims 1-6, 8-10, 12, 13, 15, 23-25, and 27 are allowed. The prior art of record (discussed below) fails to disclose or reasonably suggest a periodic, alternating-index type photonic bandgap structure (wherein the alternating layers of material define respective first and second transmission band edges which correspond to first and second input frequencies of first and second incident photonic signals), the structure creating an interaction of the first and second incident photonic signal frequencies through a nonlinear mixing process to create additional frequencies and thus produce up-converted or down-converted output signal frequencies.

For the same reason, claims 7, 11, 14, 16-22, and 26 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. § 112, second paragraph, set forth in this Office action.

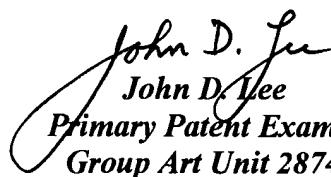
Art Unit: 2874

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 5,907,427 to Scalora et al, U.S. Patent 6,304,366 to Scalora et al, and U.S. Patent 6,396,617 to Scalora all disclose similar photonic bandgap structures but do not disclose the specific frequency up-conversion and down-conversion processes of the present application. U.S. Patent 5,999,308 to Nelson et al, U.S. Patent 6,388,799 to Arnone et al, and U.S. Patent 6,433,919 to Chowdhury et al describe various frequency conversion processes in crystalline photonic bandgap structures, but these structures are not the periodic, alternating-index type photonic bandgap structures of the present application. U.S. Patent Application Publication 2003/0039023 A1 to Romagnoli et al teaches a photonic bandgap frequency conversion structure very similar to that being claimed by applicant. Because of its later filing date, however, this Publication is not available for use as a reference against the claims of the present application. The cited articles by Scalora et al and Centini et al are relevant because they allude to the types of up-conversion and down-conversion processes claimed in the present application, but do not give any specific details regarding such processes. Other related nonlinear processes in one-dimensional photonic bandgap structures (e.g. second harmonic generation) are discussed in the cited articles by Kiehne et al and D'Aguanno et al.

All of the United States Patents listed by applicant in the Electronic Information Disclosure Statement filed on February 21, 2003, have been considered and made of record (note the attached copy of the submitted EIDS form).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the Examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the Examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

Any inquiry concerning the merits of this communication should be directed to Examiner John D. Lee at telephone number (703) 308-4886. The Examiner's normal work schedule is Tuesday through Friday, 6:30 AM to 5:00 PM. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956, to the technical support staff supervisor (Team 2) at telephone number (703) 308-3072, or to the Technology Center 2800 Customer Service Office at telephone number (703) 306-3329.

  
John D. Lee  
Primary Patent Examiner  
Group Art Unit 2874